

**The Effect of Individual Differences as
Moderator Variables on the
Effectiveness of Imagery Training in
Reducing Somatic and Cognitive
Athletic Anxiety**

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Introduction

The clinical technology developed by cognitive behavioral psychology has provided a number of tools which have been incorporated into sport psychology interventions designed to enhance performance (Whelan, Mahoney & Meyers 1991). One of the basic tools of such sport psychology interventions is visualization or imagery training. Imagery involves the covert practice of a physical task in the absence of gross muscular movement. Athletes frequently report using imagery in the process of athletic task rehearsal, and they typically judge this imagery to be a valuable preparatory strategy (Meaney 1984, Rushall, 1988). Consequently imagery training has been considered an important psychological skill for athletes to master and has become a basic tool for applied practitioners (Haliwell 1989) and the subject of self-help books (Orlick 1990).

Research on the effectiveness of imagery training has had mixed results (O Halloran & Gauvin, 1994). A study by Feltz and Landers (1983) for example, found imagery to be of limited benefit in motor performance. A later study by Zaichowsky and Fuchs (1988) however found that imagery combined with biofeedback had a significant impact on motor performance. Martin and Hall (1995) found that when their sample of non-elite athletes used imagery, they were more likely to set higher goals for themselves, have realistic self expectations and adhered more to their training programs.

It has been suggested by O' Halloran and Gauvin (1994) that the type of questions addressed and the differing conceptual foundations of researchers in imagery processes may contribute to the mixed. These researchers demonstrated the importance of assessing the role of individual differences in moderating the effectiveness of imagery training on motor performance (O' Halloran and Gauvin 1994). However, the published research in the area of individual differences as moderating variables in imagery effectiveness area is scarce.

One individual difference which was also looked at by O'Halloran and Gauvin (1994) was preferred cognitive style. Preferred cognitive style refers to an individual's preferred mode of thinking. Previous research has provided evidence to suggest that information can be processed in either of two ways - in terms of images or in terms of words (Paivio 1971, 1986). Isaacs (1982) developed the Preferred Imagic Cognitive Style (PICS) which provides a measure of cognitive preference. Individuals who prefer an Imagic mode of thinking use a pictorial mode of thought more frequently. Alternatively, Individuals who favor a verbal mode of thought do not use a pictorial mode very often. It could then be hypothesized that imagery training would be more effective in imagic individuals because it constitutes their preferred mode of thinking. The relationship between cognitive preference and effectiveness of imagery training is one which has received very little research attention.

Also scarce in the sport psychology literature is the reporting of research (as opposed to anecdotal recounting) assessing the effectiveness of imagery training in anxiety control. It has long been accepted that anxiety impairs sport performance (Maynard,

Hemmings & Warwick-Evans, 1995). Currently, anxiety is seen as a complex multidimensional construct that differentiates anxiety into cognitive and somatic components. Cognitive anxiety, as described by Burton (1988), is the “mental component of anxiety caused by negative expectations about success or negative self-evaluation”. Somatic anxiety refers to the physiological or affective component of anxiety, directly related to autonomic arousal (Burton 1988).

The conceptualization of state anxiety into cognitive and somatic components has resulted in the development of a sports-specific multidimensional state anxiety inventory, the Competitive State Anxiety Inventory-2 (CSAI-2) (Martens, Burton, Vealey, Bump, and Smith (1990). Research in sport psychology has demonstrated that interventions designed to enhance athletes’ anxiety control, usually result in enhanced performance (Blumenstein, Bar-Eli, Tenenbaum 1995). Systematic desensitization is one of a variety of methods used to break down anxiety-response habits (Wolpe 1990). After a physiological state inhibiting anxiety has been induced through muscle relaxation, a weak anxiety inducing stimulus is introduced, through imagery, for a few seconds. If exposure is repeated, the stimulus progressively loses its ability to evoke anxiety. Successively stronger stimuli are then similarly treated.

The purpose of the present study is to assess the influence of preferred cognitive style on the effectiveness of an imagery based systematic desensitization procedure. It is hypothesized that participants with preferred Imagic thinking will benefit more from the imagery based systematic desensitization procedure than will participants with preferred Verbal thinking styles.

Method

Procedure

This study was conducted in two phases: (1) a screening phase using a battery of tests for the assessment of preferred cognitive style, and previous exposure to imagery training. (2) Targeted participants were matched to undergo an imagery based systematic desensitization treatment.

Pre - Treatment Screening

Participants

Data were collected from a random sample of 90 athletes. All were scholarship athletes of the Hong Kong Sports Institute, (55 males and 35 females). The age range was from 12 to 43, with a mean age of 17.87. All participants were Chinese nationality.

Instruments

Competitive State Trait Anxiety Inventory (CSAI-2) (Martens et al 1990). This sport specific test has been widely used in sport psychology research and reliability and validity has been reported as satisfactory in the literature.

The Preference for an Imagic Cognitive Style Test (PICS) (Isaacs 1982), is the only test available which measures imagery preference. The purpose of the test is to assess four dimensions pertinent to subjects' imagery and hypnotic ability. The four dimensions are(1) the amount of internal verbalization or dialogue present; (2) the

vividness of any imagery present in their thought; (3) the degree to which participants became involved or absorbed in their thinking; and (4) the amount of effort it takes to develop a train of thought along the lines of a suggested topic. These four dimensions derive four scores called PICS-Verbal, PICS-Imagery, PICS-Absorption and PICS-Effort respectively. These four scores were used to identify the verbal and the visual subjects by subtracting the PICS-Verbal and PICS-Effort scores from the PICS-Imagery and the PICS- Absorption scores. These scores range from -22 to +22 where -22 indicates a preference for verbal thinking and =22 indicates a preference for imagic thinking. Following Isaac's (1982) original study, participants scoring less than 11 (the mean score obtained in the original study by Isaacs (1982)) were classified as Verbal and those scoring greater than 11, as Imagic. The PICS has been found to have discriminant validity with the Content Balanced Social Desirability Scale (Differential Personality Questionnaire) (Tellegen and Atkinson 1974)). Concurrent validity with the Tellegen and Atkinson Absorption Scale (Tellegen and Atkinson 1974). Paivio's Ways of Thinking Questionnaire (Paivio 1971) and with the Vividness of Visual Imagery Questionnaire (Marks 1993), has previously been reported. Furthermore, Factor Analytic data have confirmed that there is bi-polarity between the Imagery and Absorption scores and the Verbal and Effort scores (Isaacs 1982). Internal consistencies for each of the factor subscales are in the satisfactory range (Absorption, 0.58; Effort, 0.61; Verbal, 0.69 and Imagery 0.75) (Isaacs 1982).

Then, these subjects were matched with their experience of visualization training and their highest achievement in sport to form a waiting list for desensitization treatment.

Pre-Experimental Procedure

The four dimensions of participants' imagery and hypnotic ability were assessed repeatedly in three parts, in the form of one-page questionnaire for each part. The preamble of each part was recorded on one continuous tape leaving two minutes for each recollection or imagining of different scenario. Participants were then asked to answer four questions relating to the above four dimensions with indications of intensity.

In the first part of the PICS Test, participants were asked to recollect a personal experience that had strong positive emotional impact for them. They were given two minutes of silence for thoughts with their eyes closed. After two minutes, the recorded instructions invited them to answer the four questions on the questionnaire. Five-point rating scales were used to assess the first three questions and a four-point rating scale for the fourth question.

In the second part, participants were asked to imagine a scene as if they were walking alone in a park at 6:30 in the morning. Similarly to the first part of the test, they were given two minutes with their eyes closed to think silently about their feelings and what might happen there. Participants were then asked to answer the four items on the questionnaire.

In the last part of the PICS Test, participants were asked to view a fifteen-second still presentation of a scene on a computer screen depicted from the viewpoint of a person standing on a ship looking into the ocean. Participants were also given two minutes to experience what the scene on the computer screen brought to mind. They then answered the four questions as in parts one, and two.

Experimental Treatment Procedure

Participants

From the initial pool of 90, 24 participants were identified as verbal thinkers (13 males, 11 females), 59 as imagic (37 males, 22 females) and 7 as neutral. Participants were matched on the following parameters: previous exposure to formal imagery training, frequency of practice of imagery and sporting achievement level. Sixteen verbal and imagic participants matched the criteria for treatment. Due to busy competition schedules, retirement from scholarship, school examinations and unwillingness to take further part in the study, only 5 verbal and imagic participants matched and agreed to participate in the next phase of the study - the imagery based systematic desensitization treatment.

Desensitization Treatment

The selected participants were invited to come to the Sport Psychology office three times a week for two weeks for individual treatment. Each session lasted thirty minutes. During the initial session, the participant was asked to identify one specific situation during competition that he/she was most anxious about. Then the participant

was then asked to separate this situation into six anxiety levels and to assign each level with a subjective-value (sub) from 0 to 60 (not at all anxious to highly anxious) with not more than 10 points between each level. A Chinese version of the Competition State Anxiety Inventory (CSAI-2) was given to the subject to assess the baseline measurement of the participant's somatic and cognitive anxiety level when he/she thought of the highest level competition anxiety situation before treatment.

Also, pre-treatment objective baseline measure was taken of the participant's physiological responses of Skin Conductance and Heart Rate when he/she imagined the highest level of competition anxiety situation. Biofeedback equipment (PROCOMP) was used to take these measures.

In the six sessions of the systematic desensitization treatment, the participant was asked to, first, listen to a 14' 17" progressive muscular relaxation tape to achieve a state of relaxation. This was followed by a 2' 43" visualization tape of a neutral scene (walking along a sandy beach at sunset) to induce the participant's anxiety level to zero. After that, the participant was verbally instructed to further relax him/herself by taking five deep breaths with his/her eyes remaining closed. Then, the participant was invited to vividly visualize the situation which had been defined as the lowest sub level of competition anxiety, and to raise his/her index finger to indicate when the image was clear. At that point the participant's anxiety sub value was recorded. The verbal part of the desensitization treatment was repeated until the participant's report of the anxiety level has decreased by more than half of the sub values from zero or

from the previous level. The research assistant recorded the duration of each session of desensitization treatment for data analysis.

Immediately after the 6th session, the Chinese version of the Competition State Anxiety Inventory was again given to the participant to comparatively assess again his/her somatic and cognitive anxiety level after treatment. Post-treatment Skin Conductance and Heart Rate responses were also recorded.

Results

A series of two-tailed t-tests for paired samples was conducted to assess pre-and post-treatment differences on measures of cognitive and somatic anxiety. SPSS software facilitated these analyses. Within group pre- and post- treatment biofeedback measures of heart rate and skin conductance were also compared using similar analyses. Two-tailed t-tests for paired samples indicated that before treatment, no significant differences existed between the verbal and imagic groups on the measures of cognitive anxiety, somatic anxiety and confidence.

The verbal group showed a significant decrement in post-treatment cognitive anxiety compared to pre-treatment levels ($t=.03$, $p < .05$). Scores on somatic anxiety tended towards significance ($t=.09$, $p < .05$) but failed to reach statistically significant levels. The verbal group showed no significant differences between pre-and post-treatment measures of confidence as reported through the CSAI-2.

The imagic group results revealed a significant difference in pre- and post-treatment cognitive anxiety levels ($t=.001$, $p<.01$) at a more stringent significance level.

However no significance differences in pre- and post-treatment levels of somatic anxiety were found. Confidence measures for the imagic group also failed to reach significance between pre- and post-treatment testing.

Between group measures of anxiety pre- and post-treatment, failed to reach significance, indicating that the imagery based systematic desensitization treatment was neither more nor less effective for participants with a verbal preferred cognitive style or an imagic preferred cognitive style.

Biofeedback physiological measures of heart rate showed significant decrements between pre- and post-treatment for both the verbal and the imagic groups (Verbal, $t=.000$, $p<.001$; Imagic, $t=.021$, $p<.05$). Similarly biofeedback physiological measures revealed decrements between pre- and post- treatment measures on skin conductance (Verbal $t=.000$, $p<.05$; Imagic $t=.01$, $p<.05$).

Discussion

The purpose of this study was to assess the influence of preferred cognitive style on the effectiveness of an imagery based systematic desensitization procedure. Such a procedure has long been established in psychology practice as an effective intervention for many types of phobia anxieties (Wolpe 1990). Psychologists working with elite athletes have also used systematic desensitization successfully as an intervention procedure (Blumenstein, Bar-Eli, Tenenbaum 1995).

Because systematic desensitization depends on the participant being able to effectively visualize or mentally imagine scenes related to the anxiety stimulus, it was hypothesized that those with a preferred cognitive style that was primarily visual, or imagic (Isaacs 1982) would be able to more effectively benefit from it.

The results of the study did not support the hypothesis. The imagery based systematic desensitization procedure proved equally effective for the reduction of anxiety for all participants, regardless of preferred cognitive style.

Interestingly, the systematic desensitization procedure appeared to be effective for the cognitive component of anxiety, as defined by Burton (1988). In other words, negative expectation or negative self-evaluative thoughts, which have been previously shown to be the more important contributor to performance decrements for athletes, were successfully combated.

Somatic anxiety, as reported through the CSAI-2 in this study, did not appear to be affected by the treatment. However, the more objective biofeedback data did indicate a significant decrease in heart rate and in skin conductance. Heart rate and skin conductance are related to autonomic arousal. Increases in these measures indicate higher levels of arousal and vice versa. Thus, it would seem that the somatic component of anxiety was effectively decreased by the systematic desensitization procedure. However, it may be suggested that the somatic sub-scale of the CSAI-2 was not sensitive enough to detect this change. The more objective biofeedback measures were able to successfully identify these changes.

The assessments of confidence showed no significant differences between pre-and-post treatments in this study. However, confidence was not a target of the procedure, so, this is not surprising. Nevertheless, one might expect that having learned successfully to conquer a situation specific anxiety, the athletes might be more confident about their coping abilities. It is suggested here that the confidence subscale of the CSAI-2 may not have been sensitive enough or specific enough to tap this data.

Conclusion

What has been shown by this study is that, for athletes whose performance may be inhibited by anxiety, there exists a simple procedure to obtain competence and control over anxiety stimuli. Within six thirty-minute sessions, athletes in this study were able to successfully gain control over the negative thinking that results from anxiety. They also successfully learned to reduce the autonomic arousal associated with such stimuli.

This study also demonstrated that the systematic desensitization procedure used can be applied to all athletes, irrespective of preferred cognitive style. This is an important finding, as anxiety concerns are common in elite athletes who seek help from the sport psychologist. If systematic desensitization were only useful for a certain percentage of the athlete population, then, it would indeed be limited in its value.

One advantage of using systematic desensitization is that once the athlete has learned how to relax and visualize, these skills can be broadly applied to cope with other stressful situations. Therefore, it is expected that a strong training transfer would occur. However, this could perhaps be the subject of a future research in this area.

The importance of using sensitive equipment such as biofeedback in measuring the subtle physiological responses to anxiety was also demonstrated in this study.

Most of the limitations of this study relate to the fact that two members of the research team, including the chief investigator who designed the study, left the Hong Kong Sports Institute for other countries in the initial stages of the study.

Consequently, co-ordination problems resulted in a number of deficiencies including, lack of control group, difficulty in recruiting participants, time constraints, and other inadvertent changes to the original design.

It is recommended that future research projects of this type have at least two members of staff, in situ, available to implement the study.

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Abstract

This study proposes to open the research dialog on imagery training and Hong Kong elite athletes by looking at the influence of preferred cognitive style (Isaacs 1982), as a mediating variable in the effectiveness of a program of imagery training designed to alleviate the anxiety symptoms aroused by a specific competitive situation.

The objectives of the study are (1) to evaluate the effectiveness of an imagery training program on reducing anxiety symptoms in Hong Kong elite athletes (2) to determine the influence of preferred cognitive style on imagery training outcomes for Hong Kong elite athletes.

The result of this study found that systematic desensitization procedure, the imagery training program we used to reduce anxiety, proved equally effective for all participants, regardless of preferred cognitive style.